RECORD OF DECISION

FOR THE

SELMA PRESSURE TREATING COMPANY

SUPERFUND SITE

PREPARED BY

THE U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION IX

SAN FRANCISCO, CALIFORNIA

SEPTEMBER, 1988

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SELMA RECORD OF DECISION

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

The Selma Pressure Treating Company (SPT) site is located in Selma, California, 15 miles south of the City of Fresno, in California's Central Valley.

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedial action for the Selma Pressure Treating site, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, and the National Contingency Plan. This decision is based on the administrative record for this site. (The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based). The State of California has concurred on the selected remedy.

DESCRIPTION OF THE SELECTED REMEDY

This Record of Decision (ROD) for the Selma Pressure Treating site includes the following actions to address contaminated soil and groundwater for the entire site (there are no operable units):

- Conventional water treatment to remove chromium from the groundwater, including:
  - Extraction of contaminated groundwater
  - Treatment of contaminated groundwater using precipitation, coagulation, and flocculation processes to remove chromium to meet the applicable drinking water standard
  - Disposal of treated and tested groundwater by reinjection into the aquifer or off-site disposal, as appropriate
  - Groundwater monitoring to verify contaminant clean-up
- Soil fixation with a Resource Conservation and Recovery Act (RCRA) Cap to treat contaminated soil, including:
  - Excavation of contaminated soils exceeding cleanup goals
  - Mixing soils with a fixative agent to solidify and stabilize contaminated soil
  - Replacement of fixed soil into excavated areas and covering the fixed areas with a RCRA Cap

- Long term monitoring of fixed soils for a period of approximately 30 years

- Long-term access and land use restrictions for fixed areas and short-term institutional controls to prevent use of contaminated groundwater until remediation is complete

DECLARATION

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate to this remedial action and is cost-effective. The groundwater remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions to the maximum extent practicable. The soil fixation/RCRA Cap element of this remedy is not considered fully permanent, due to the need for long-term monitoring. It does employ treatment that significantly reduces mobility as a principal element. However, toxicity is not reduced and volume is increased due to addition of the fixative agent.

Because this remedy will result in hazardous substances remaining on the site, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. The State's letter of concurrence is attached.

David W. McGovern — 9.24.88

Daniel W. McGovern
Regional Administrator

Date

DECISION SUMMARY

I. SITE NAME, DESCRIPTION, AND LOCATION

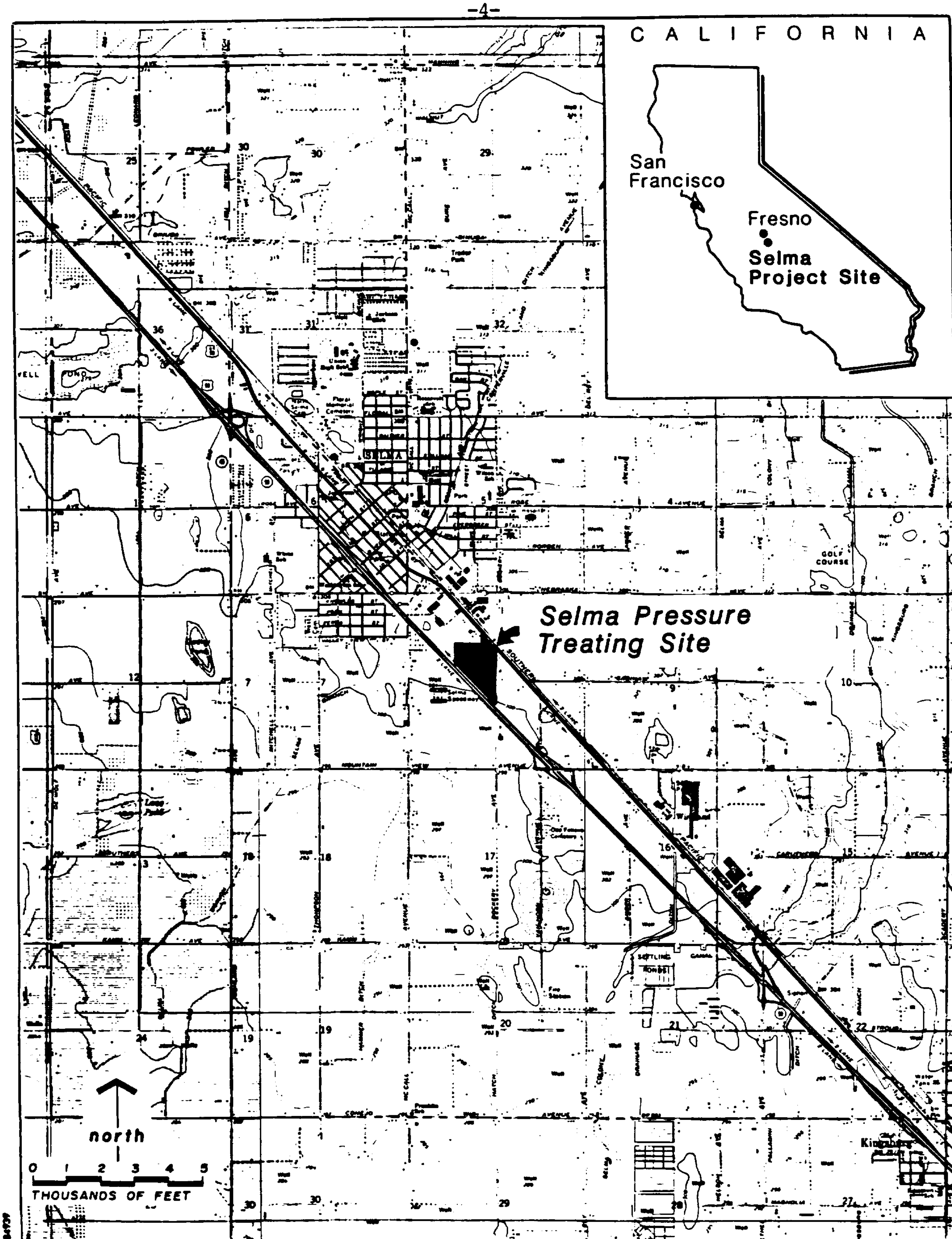
The SPT site is located about 15 miles south of Fresno and adjacent to the southern city limits of Selma (Figure 1). Dockery Avenue and Golden State Boulevard (old Highway 99) mark the entrance to the site. The SPT site comprises approximately 18 acres, including a 3-4 acre wood treatment facility and 14 acres of adjacent vineyards that were used for site drainage.

Zoned for heavy industrial use, SPT is located in a transition zone between agricultural, residential, and industrial areas. Situated in the center of the San Joaquin Valley, the area contains many vineyards, and Selma is labeled the "Raisin Capital of the World." Urban residential areas lie to the north, and scattered suburban dwellings surround the site. Approximately 12 residences and/or businesses are located within 1/4 mile of the SPT site. Currently, a wood treating facility, Selma Treating Company (STC), is operating at the SPT site. STC is owned by Saw Mill Properties, Inc. STC operations are regulated by state Waste Discharge Requirements Order No. 78-171, which precludes discharges to areas having hydraulic continuity with groundwater. At the time STC began operating, the Regional Water Quality Control Board (RWQCB) required installation of drip pads, berms around the site, and runoff containment to prevent ongoing contamination.

The Consolidated Irrigation District provides the majority of the irrigation supply in the area. The surface water irrigation supply is supplemented by groundwater resources in the vicinity of the site. The groundwater resources also supply the necessary domestic water for the surrounding communities and the scattered county residences. The regional groundwater gradient in the vicinity of the site is to the southwest. The groundwater resources in the area of the SPT site have been classified as a Sole-Source Aquifer by the U.S. Environmental Protection Agency, under the Safe Drinking Water Act, 42 U.S.C. §1424(e). Under EPA's Groundwater Protection Strategy (1984), the aquifer in the SPT area has been classified as a Class II A current drinking water source with other beneficial uses.

No other significant natural resources were found at SPT, such as federal or state rare, threatened, or endangered species, or wetlands. The site is not included on the National Register of Historic Places under the Historic Preservation Act of 1966, 16 U.S.C. §470 et seq.

The climate for the site consists of hot summers and mild winters. The maximum temperatures are generally around 100°F in July, with a minimum temperature of 35° in January.



Project No.	Selma Pressure Treating Site	REGIONAL LOCATION MAP	Figure
123-RI1	Camp Dresser & McKee Inc.		1

DATAPRINT N84729

Average annual precipitation in the area is less than 10 inches. The monthly evaporation losses range from two inches per month during the winter to 18 inches per month during the summer.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Treatment of lumber products has been ongoing at the SPT site since 1942. The original wood treatment facility covered approximately 3-1/2 acres. In 1961, the treatment operation was taken over by Gerald Petery, the son of the original owner, and his wife, Mary Ann Petery (now Schuessler). A summary of the operating history of the Potential Responsible Parties (PRP's) is as follows:

Dates	Owners
1961-1/1970	Gerald Petery and Mary Ann Petery operated the facility as individuals.
1/1970-12/1977	Gerald Petery and Mary Ann Petery incorporated as Selma Pressure Treating Company, which was responsible for operating the facility.
1971-Present	Selma Leasing Company (SLC) was organized and owned by Gerald Petery. SLC became the owner of the land upon which SPT, and later Saw Mill Properties, Inc., operated.
12/1977-late/1981	Gerald Petery sold his interest in SPT to Mary Ann Schuessler (formerly Petery). Mary Ann Schuessler became the sole owner, president, and operator of SPT.
4/1981	SPT filed for bankruptcy and First Interstate Bank or a trustee took over the operation.
2/1982	SPT's trustee sold wood treating assets to Saw Mill Properties, Inc.
2/1982-Present	Saw Mill Properties, Inc. has operated the facility, as Selma Treating Company.

The wood-preserving process originally employed at the site involved dipping wood into a mixture of pentachlorophenol and oil, and then drying the wood in open racks to let the excess liquid drip off. A new facility was constructed in 1965, and SPT converted to a pressure treating process which consisted of conditioning the wood and then impregnating it with chemical preservatives.

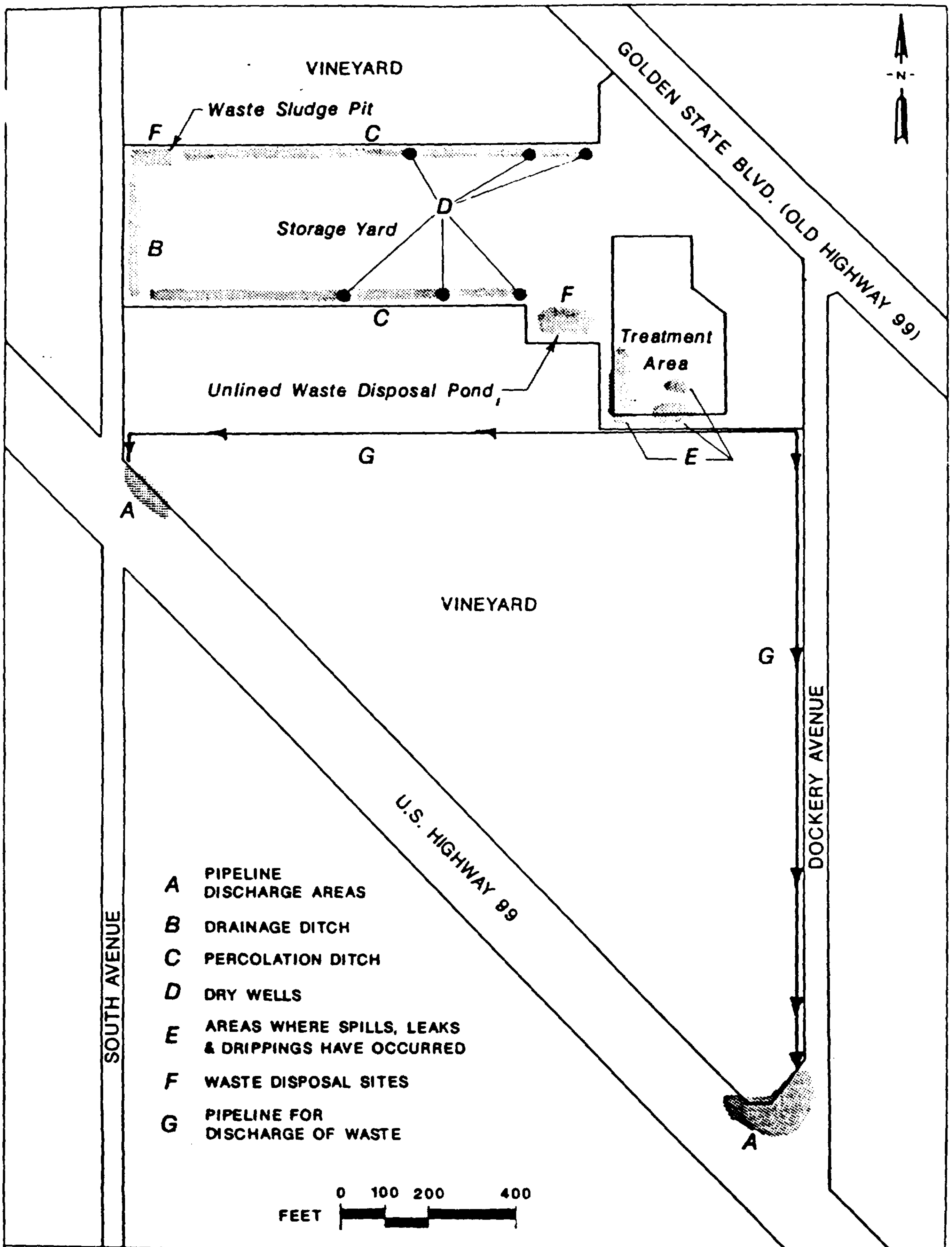
Prior to 1982, discharge practices included: (1) runoff into drainage and percolation ditches, (2) drainage into dry wells, (3) spillage onto open ground, (4) placement into an unlined pond and sludge pit, and (5) discharges to the adjacent vineyards. These wastes were generated from spent retort fluids and sludges. Figure 2 depicts these disposal sites.

Between 1971 and 1981, the Regional Water Quality Control Board (RWQCB) regulated the discharges from SPT, under a Waste Discharge Requirements Order. An Uncontrolled Hazardous Site Investigation was conducted on January 31, 1981 in accordance with §3007 of the Resource Conservation and Recovery Act (RCRA), by the EPA's Field Investigation Team (FIT), the California Department of Health Services (DHS), and the RWQCB. This inspection raised concerns about the potential for groundwater contamination from the site. As a result, SPT was required to modify its operation to minimize the potential for contamination. Initial site investigation activities were then conducted by the state and EPA to assess contamination problems.

Between 1981 and 1984, RWQCB, EPA, and DHS pursued efforts to have SPT and, later, SLC investigate the site to determine the extent of contamination. In September of 1981, the RWQCB issued a Cleanup and Abatement Order to SPT, requiring a geotechnical investigation and establishing a timetable for cleanup. The timetable for cleanup was not submitted to the RWQCB and in September of 1984, the RWQCB referred the Order to the California Attorney General's office, for enforcement. The Attorney General's office is pursuing a case against SLC, SPT, Gerald Petery, and Mary Ann Schuessler, on behalf of itself and the RWQCB. Gerald Petery has filed a cross-claim against a number of parties, including Mary Ann Schuessler, various chemical manufacturers of PCP, EPA's consultant, CDM, First Interstate Bank, Koppers, and Osmose.

In September of 1983, DHS informed SPT of violations and transmitted an Order, Settlement Agreement, and Schedule of Compliance, including civil penalties of $75,000. In December of 1983, DHS found SLC's counter proposal to this Order to be unsatisfactory. DHS referred the site to EPA for further action in April of 1984.

In August of 1983, EPA ranked the site using the Hazardous Ranking System (HRS) 40 C.F.R. Part 300, Appendix A, as authorized under 42 U.S.C. §105(a)(8), to determine whether to include the site on the Superfund National Priorities List of hazardous waste sites. The HRS ranking for the site indicated that releases of hazardous substances from the site may present a danger to human health and the environment. Based on this information the site was placed on the Superfund National Priorities List of hazardous waste sites in September 1983. The HRS ranking was 43.83, and the site was listed as number 195.



Project No. 123-FS1	Selma Pressure Treating Site Camp Dresser & McKee Inc.	AREAS OF SUSPECTED CONTAMINATION	Figure -2-

In September 1984, EPA requested Camp Dresser & McKee Inc. (CDM), under their REM II contract, to prepare a Work Plan outlining the tasks required to prepare a Remedial Investigation and Feasibility Study (RI/FS) for the site. CDM submitted the Work Plan outlining the RI/FS activities to be conducted, on June 7, 1985. The various project plans required to support the field investigation activities were submitted in 1985 and 1986. Field activities were initiated in April 1986, and were conducted in various phases through August 1987. The final RI report (CDM, 1988) provides the results of those field activities. An Endangerment Assessment (EA) was prepared to assess risks to human health and the environment associated with the No Action Alternative (ICF, 1988). The FS report (CDM, 1988) analyzes alternatives based on data collected and analyzed during the RI investigation and based on the results of the EA.

Potentially Responsible Parties (PRPs) have not been involved in development of the RI/FS. EPA is currently in discussion with PRPs regarding the potential for their involvement in the Remedial Design/Remedial Action (RD/RA) phases of this project and for recovery of past costs. Special notice letters will be issued in the near future under §122(e) of CERCLA. PRPs identified include Gerald Petery, Mary Ann Schuessler, and First Interstate Bank.

At present, technical discussions with PRPs have been limited to formal comments on the FS/Proposed Plan and related meetings. This information is included in the responsiveness summary and is part of the administrative record.

III. COMMUNITY RELATIONS

The following is a summary of community relations activities conducted by EPA for the SPT site, in order to meet the requirements under Sections 113(k)(2)(i-v) and 117 of CERCLA.

Dates	Activities
March/April 1985	EPA community relations (CR) representatives conducted community assessment interviews with interested community members in the Selma area.
July 1985	EPA distributed a fact sheet announcing the commencement of RI/FS work, and describing the RI/FS activities to the community.
July 1985	EPA held a community meeting in Selma to explain RI/FS activities that EPA was undertaking and to respond to the community's questions and concerns.

January 1986	EPA finalized the Community Relations Plan detailing the community concerns as expressed in the July 1985 community assessment interviews and communitty meeting.
March 1986	EPA distributed a fact sheet describing the purpose and nature of the monitoring wells placed in the Selma area. EPA also distributed a Spanish translation of this fact sheet.
May 1986	EPA Community Relations Coordinator met informally with community members to listen to their concerns and to explain current site activities.
July 1987	EPA distributed well sampling results to interested community members.
April 1988	EPA distributed a fact sheet detailing the results of the RI.
June 1988	EPA distributed a fact sheet explaining the contents of the FS Report and announcing the upcoming public comment period and community meeting.
June 22, 1988	EPA held a community meeting to explain the FS Report and to receive public comment on EPA's Proposed Plan for addressing the soil and groundwater contamination at the SPT site.
September 1988	Notice of this ROD, or Final Plan, will be published and made available to the public before commencement of the remedial action.

IV. SITE CHARACTERISTICS

The following discussions address contamination problems for the entire SPT site; there are no operable units (i.e., sub-investigations) for this site. All data were validated by Region 9, EPA, using standard review protocols and data quality was considered in analysis of the data and in reaching the decision.

A. Surface And Subsurface Soil Results

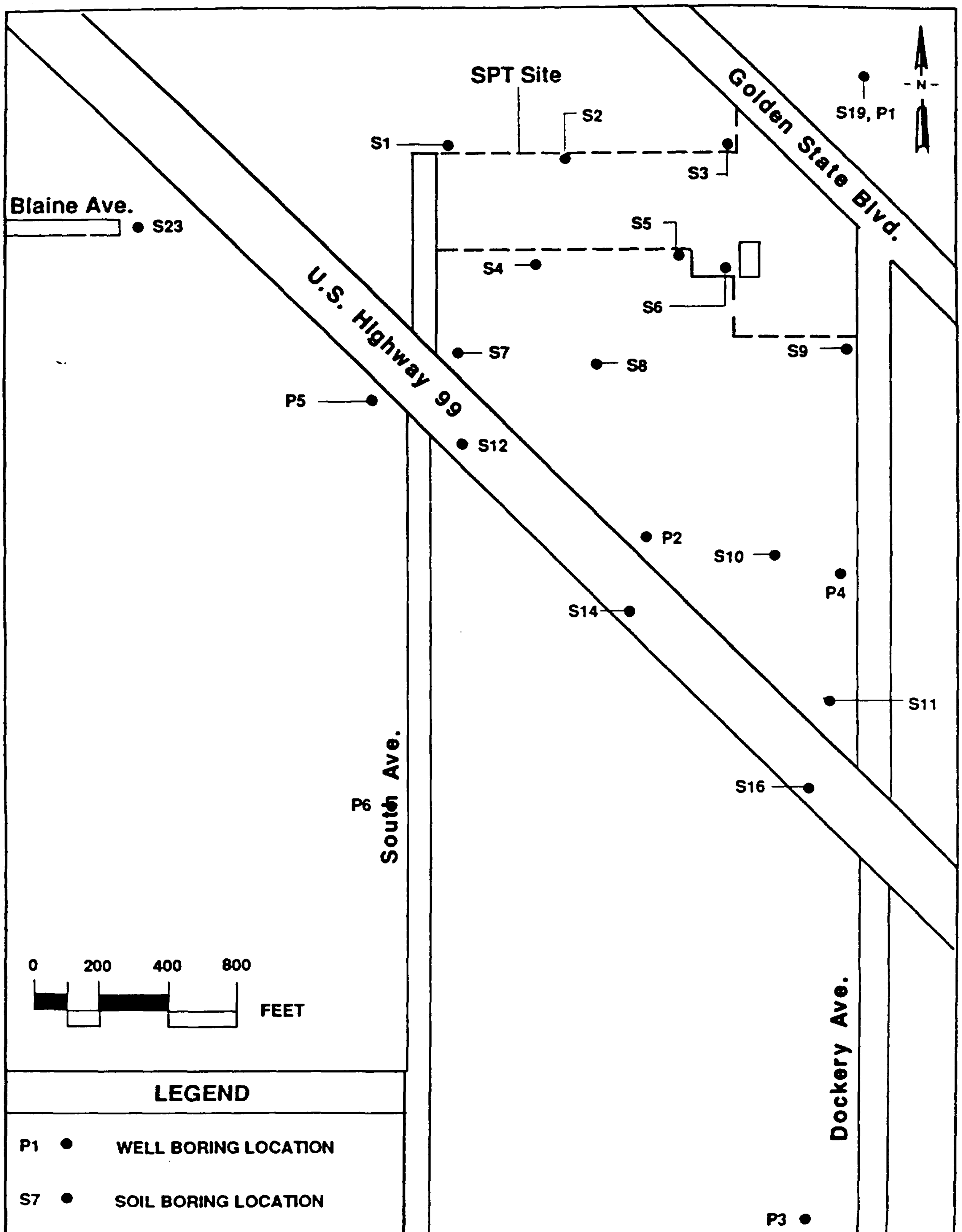
A total of 48 surface soil samples were collected during two rounds of sampling. The samples were collected from locations where waste was suspected to have been discharged, from known waste disposal areas, and from background locations. The samples were analyzed for a variety of constituents, including: An initial screening for Hazardous Substance List (HSL) volatiles, semi-volatiles and metals; hexavalent chromium; individual phenols; and dibenzodioxin/dibenzofuran (dioxin/furan) chlorinated tetra through octa homologs. A subsequent phase to confirm earlier results was performed and included analysis for isomer specific chlorinated dioxin/furans and metals. The site-related contaminants of concern found in surface soils included chromium, arsenic, copper, dioxin/furan, pentachlorophenol (PCP), and trichlorophenols (TCP).

A round of subsurface soil samples was collected at 21 boring locations during the RI field program (Figure 3). Samples were generally collected at the following depths: 1 to 2.5 feet (ft.), 2.5 to 4.0 ft., 4 to 5.5. ft., 10 to 11.5 ft., 15 to 16.5 ft., and 20 to 21.5 ft. (e.g. to the water table). The samples were analyzed for individual phenols, chromium, arsenic, and copper. Selected samples were also analyzed for the tetra through octa chlorinated dioxin/furan homologs, without identification of isomers. Chemicals of concern for the subsurface soils were the same as for the surface soils.

The soil sampling results identified seven areas where past practices resulted in levels of contamination above background concentrations that they warranted further evaluation. The seven soil contamination areas are the Waste Sludge Pit, North Unlined Percolation Ditch (Ditch A), South Unlined Percolation Ditch (Ditch B), Unlined Waste Disposal Pond, Drainage Area, Southeast Disposal Area, and Southwest Disposal Area. Table 1 provides the highest level for each of the contaminants of concern detected in each area of concern. Figure 4 identifies the location of each of the areas. The boundary of each area was based on the available sampling data and geographical features associated with each site.

These locations represent areas of concern due to the elevated levels of site-related contaminants detected at each of these sites. For example, high levels of arsenic, up to 4120 ppm, were detected at the Waste Sludge Pit. High levels of arsenic were also detected at the Unlined Waste Disposal Pond and Southeast Disposal Area. Elevated levels of dioxin/furan contamination, in tetra chlorinated dibenzodioxin (TCDD) equivalents, were detected at the former Unlined Waste Disposal Pond and the Southeast Disposal Area.

TCDD equivalents are a means of comparing the levels of dioxin/furan contamination in various locations. The toxicity of a particular dioxin/furan compound is



Project No.	Selma Pressure Treating Site	SUBSURFACE SOIL SAMPLING LOCATIONS	Figure
123-FS1	Camp Dresser & McKee		3

TABLE 1 MAXIMUM CONTAMINANT CONCENTRATIONS FOUND IN SOILS

Location	Arsenic mg/kg	Chromium mg/kg	Copper mg/kg	PCP µg/kg	Total[1] TCP µg/kg	Total[1] Dioxins ng/g	Total[1] Furans ng/g	TCDD[2] EQUV ng/g	Total TCDD ng/g	Total TCDF ng/g	Total PeCDD ng/g	Total PeCDF ng/g	Total HxCDD ng/g	Total HxCDF ng/g
Waste Sludge Pit (Sample Sites W04, S34-S38)														
- Surface	4120	3910	1870	11000	R	283.8	56.6	.29	ND	ND	ND	ND	3.4	6.8
Unlined Percolation Ditch A (Sample Sites S1, S2, S3)														
- Surface	55	196	121	2100	R	130.2	40.1	.31	ND	ND	ND	0.7	3.4	5.4
- 1 to 2.5 ft.	ND	13	14	32	277	63.2	11.5		ND	ND	ND	0.05	0.71	1.7
- 2.5 to 4 ft.	22	9.7	9.6	34.9	4.9	32.9	2.7		ND	ND	ND	ND	0.21	1.1
- 4 to 5.5 ft.	23	9	10	365	14	40.3	10.1		ND	ND	ND	ND	0.85	1.3
- 10 to 11.5 ft.	3.2	8	7.3	21.1	80	2.5	0.48		ND	ND	ND	ND	NA	0.061
- 15 to 16.5 ft.	3.5	11	12	ND	ND	NS	NS		NS	NS	NS	NS	NS	NS
- 20 to 21.5 ft.	ND	12	18	43	38	1.0	0.18		ND	ND	ND	ND	ND	ND
Unlined Percolation Ditch B (Sample Sites S4, S5)														
- Surface	ND	12	17	ND	ND	7	2.5	.01	ND	ND	ND	ND	ND	ND
- 1 to 2.5 ft.	3.7	15	11	ND	10	0.9	ND		ND	ND	ND	ND	ND	ND
- 2.5 to 4 ft.	12	23	10	23.1	ND	0.8	0.1		ND	ND	ND	ND	ND	0.21
- 4 to 5.5 ft.	6.3	19	12	340	ND	12.5	2.5		ND	ND	ND	ND	ND	0.28
- 10 to 11.5 ft.	5.3	11	18	11.4	13	0.2	ND		ND	ND	ND	ND	ND	NA
- 15 to 16.5 ft.	ND	13	8.3	26	ND	NS	NS		NS	NS	NS	NS	NS	NS
- 20 to 21.5 ft.	ND	12	12	ND	41	ND	ND		ND	ND	ND	ND	ND	ND
Unlined Waste Disposal Pond (Sample sites W03, S29 - S33)														
- Surface	850	879	553	460,000	R	1228.7	634	5.65	ND	ND	ND	11.9	117	232
Southwest Disposal Area (Sample site S7)														
- Surface	21	24	9	ND	ND	1253.7	361.9	.29	ND	0.12	ND	2.8	12.7	64.7
- 1 to 2.5 ft.	31	31	5.6	ND	3	621.3	119.7		ND	0.19	ND	1.0	7.3	24.6
- 2.5 to 4 ft.	25	15	ND	ND	ND	21.1	0.7		ND	ND	ND	ND	ND	0.11
- 4 to 5.5 ft.	28	11	ND	ND	ND	2.64	ND		ND	ND	ND	ND	ND	ND
- 10 to 11.5 ft.	9.9	8.9	6.3	ND	ND	1.7	ND		ND	ND	ND	ND	ND	ND
- 15 to 16.5 ft.	17	6.7	5.1	ND	ND	NS	NS		NS	NS	NS	NS	NS	NS
- 20 to 21.5 ft.	8.8	7	ND	234	8.0	0.1	ND		ND	ND	ND	ND	ND	ND

N/A Not Available
ND Not Detected
NS Not Sampled
R: Data Rejected during data validation
TCDD: Tetrachlorodibenzo-p-dioxins
TCDD EQUV: TCDD equivalents
TCDF: Tetrachlorodibenzofurans
PeCDF: Pentachlorodibenzofurans
HxCDD: Hexachlorodibenzo-p-dioxins
HxCDF: Hexachlorodibenzofuran
PeCDD: Pentachlorodibenzo-p-dioxins

1 Total dioxin/furan analysis includes Tetra through Octa homologs, of which the Octa homolog is considered innocuous.
2 TCDD Equiv. are based on both the isomer specific and homolog data.

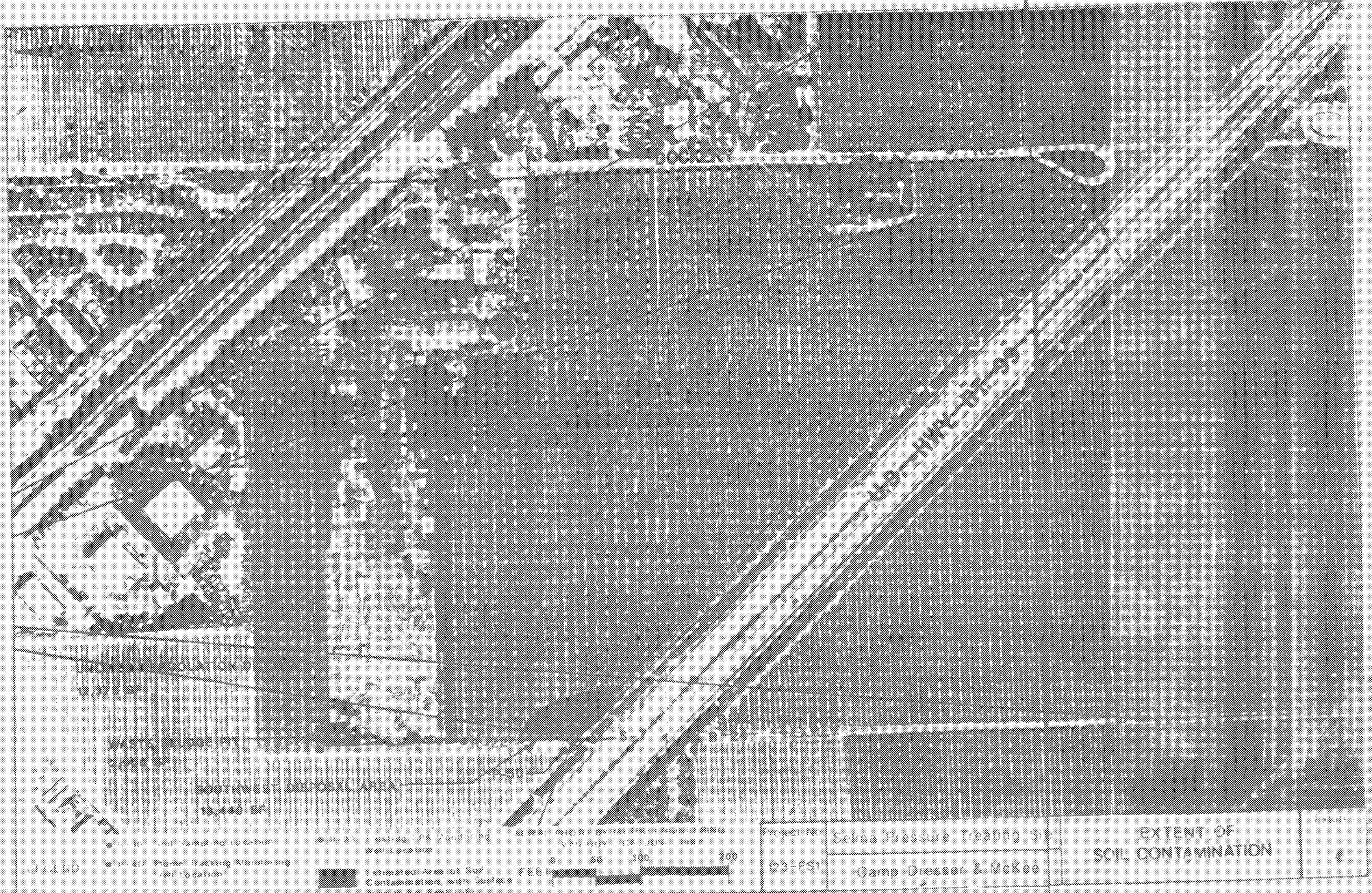

DOCKERY
U.S. HWY. RT. 99
R-22
S-1
R-24
P-50
SOUTHWEST DISPOSAL AREA
LEGEND
S-10 Soil Sampling Location
P-4D Plume Tracking Monitoring Well Location
R-21 Existing EPA Monitoring Well Location
Estimated Area of Soil Contamination, with Surface Area in Sq. Feet (SF)
AERIAL PHOTO BY METRO ENGINEERING VAN NUYS, CA JUNE 1987
FEET 0 50 100 200
Project No. 123-FS1
Selma Pressure Treating Site
Camp Dresser & McKee
EXTENT OF SOIL CONTAMINATION
Figure 4

TABLE 1 MAXIMUM CONTAMINANT CONCENTRATIONS FOUND IN SOILS (continued)

Location	Arsenic mg/kg	Chromium mg/kg	Copper mg/kg	PCP µg/kg	Total[1] TCP µg/kg	Total[1] Dioxins ng/g	Total[1] Furans ng/g	TCDD[2] EQUV ng/g	Total TCDD ng/g	Total TCDF ng/g	Total PeCDD ng/g	Total PeCDF ng/g	Total HxCDD ng/g	Total HxCDF ng/g
Drainage Area (Sample site S9)														
- Surface	12.2	25	15	ND	ND	28.3	6.8	.03	ND	ND	ND	ND	0.38	0.64
- 1 to 2.5 ft.	5.0	21	7.7	ND	ND	0.5	0.1		ND	ND	ND	ND	ND	ND
- 2.5 to 4 ft.	14.0	14	17	ND	ND	13.2	2.0		ND	ND	ND	ND	0.052	0.16
- 4 to 5.5 ft.	13.0	10	12	ND	ND	11.4	.77		ND	ND	ND	ND	ND	ND
- 10 to 11.5 ft.	2.7	ND	9.2	ND	ND	0.6	ND		ND	ND	ND	ND	ND	ND
- 15 to 16.5 ft.	R	ND	7.4	ND	ND	NS	NS		NS	NS	NS	NS	NS	NS
- 20 to 21.5 ft.	1.4	7.1	13	ND	ND	0.3	ND		ND	ND	ND	ND	ND	ND
Southeast Disposal Area (Sample sites W05, S39 - S44)														
- Surface	467	390	422	200,000	92	2316.5	2214.2	1.62	ND	ND	ND	8.2	45	86.2

N/A Not Available
ND Not Detected
NS Not Sampled

R: Data Rejected during data validation

TCDD: Tetrachlorodibenzo-p-dioxins
TCDD EQUV: TCDD equivalents
TCDF: Tetrachlorodibenzofurans

PeCDF: Pentachlorodibenzofurans
HxCDD: Hexachlorodibenzo-p-dioxins
HxCDF: Hexachlorodibenzofuran
PeCDD: Pentachlorodibenzo-p-dioxins

1 Total dioxin/furan analysis includes Tetra through Octa homologs, of which the Octa homolog is considered innocuous.
2 TCDD Equiv. are based on both the isomer specific and homolog data.

dependent upon the degree of chlorination at the 2,3,7,8, position. The exception to this is the octa chlorinated dioxin/furan homologs, which are considered innocuous. The remaining tetra through hepta isomers have various degrees of toxicity. In order to assess the potential toxicity associated with the dioxin data, each sample was evaluated with respect to 2,3,7,8 TCDD equivalents. This involves converting each dioxin/furan homolog into TCDD equivalents based on the EPA approved methodology using Toxicity Equivalent Factors (TEF).

Due to the lack of vertical extent data in source areas, an estimate of vertical extent of contamination was made to calculate volumes of soil requiring cleanup. The metal contamination in the soil was assumed to extend to a depth of 20 feet, which corresponds to the approximate depth of the water table. This assumption is based on the results of the groundwater sampling, which show elevated levels of chromium in the shallow portions of the aquifer. Dioxin/furan contamination is assumed to extend to 10 feet in depth based on available subsurface sampling results from various boring locations, which indicate that dioxin/furan contamination reaches permissible levels within the first 10 feet. This is evident from Table 1 which indicates that dioxin was detected in trace levels in only one soil sample taken from below 10 feet. Additional soil borings will be collected during RD/RA to refine this information on vertical extent of contamination.

The site-related surface and subsurface soil contaminants have variable mobilities in the environment. For example, dioxin/furan compounds have very low solubilities and are extremely immobile in the soil. Copper is also not very mobile in the environment due to its strong affinity for clays, hydrous metal oxides, and soil organic matter. Trivalent chromium has similar sorption characteristics to copper, and as such, tends not to be very mobile. Hexavalent chromium is very soluble and highly mobile in the environment. Furthermore, hexavalent chromium is not easily sorbed on the soil. However, hexavalent chromium is only stable under oxidizing conditions and will form trivalent chromium in a reducing environment. In regard to PCP and arsenic, these compounds can be relatively mobile under high pH environments. However, these compounds appear to be relatively immobile at the SPT site due to the general lack of observed levels in the groundwater.

B. <u>Soil Clean-up Goals and Areas Requiring Remediation</u>

Of the organic contaminants at SPT, the site-specific risk assessment indicated that dioxin/furan would drive the clean-up goals. The clean-up goal selected for dioxin/furan contaminated soil is 1.0 ng/g (ppb), in

TCDD equivalents. This clean-up goal is based on a TCDD risk study performed by Kimbrough, et al. (1984) of the Centers For Disease Control (CDC). This study is the basis for EPA policy and clean-up goals at Superfund sites where there is dioxin contamination. The 1 ppb goal is for areas where potential residential or agricultural uses could occur. While the SPT site is currently used for industrial purposes, the 1 ppb goal was selected due to the proximity of residences and agricultural activities to the site.

The heavy metals of concern at SPT are arsenic, chromium, and copper. Based on the health risk assessment, the metals clean-up goals were driven by arsenic. However, the primary basis for the metals clean-up goals will be the protection of groundwater. The selected 50 ppm arsenic goal assumes solubility and attenuation factors which are being verified by collecting more data. During remedial design (RD), data to evaluate the solubility of the soil contaminants and establish a site-specific attentation factor may indicate that both the arsenic and chromium clean-up goals need to be modified in order to provide adequate protection of the groundwater. A modification in the clean-up goals could result in a change in the volume of soil requiring remediation.

The 50 ppm arsenic goal is protective of all direct contact scenarios except new, on-site residential development. Institutional controls are required to prevent on-site residential development.

As stated previously, seven areas of contaminated soil were identified at SPT (see Figure 4). The clean-up goals indicate that four of these areas require remediation. The four areas proposed for clean-up are the Waste Sludge Pit, the Unlined Percolation Ditch A, the Unlined Waste Disposal Pond, and the Southeast Disposal Area.

Sampling results for three other areas indicate that contamination levels are below clean-up goals. These three areas are the Unlined Percolation Ditch B, the Drainage Area, and the Southwest Disposal Area.

C. Groundwater Results

The hydrogeologic setting for the area consists of valley-fill sequence due to the deposition of sediments from the adjacent Sierra-Nevada highlands. The depositional environment results in discontinuous geologic units. The exception to the discontinuous nature of the units is a five to ten foot clay layer located at a depth of approximately 55 to 60 feet below ground surface, which appears to be continuous or semicontinuous across the site. Additional data will be collected during remedial design to verify the continuity of the clay layer. The groundwater directly underlying the site is an unconfined aquifer.

Three rounds of groundwater samples were conducted in the vicinity of the SPT site. The first round of sampling occurred in April-May 1986 and included several regional domestic and irrigation wells, as well as five existing EPA monitoring wells installed by the EPA Environmental Response Team (ERT). The second round of sampling was performed in February-March 1987. This round included the sampling of the five existing EPA monitoring wells and the ten newly installed plume tracking monitoring wells. A third round of sampling occurred in July-August 1987 and included all of the monitoring wells and selected regional wells. The analyses performed for each round were as follows:

1. First Round, April-May 1986:

   Individual phenols (Method 604)
   Routine Analytical Services (RAS) Metals
   General water quality parameters

2. Second Round, February-March 1987:

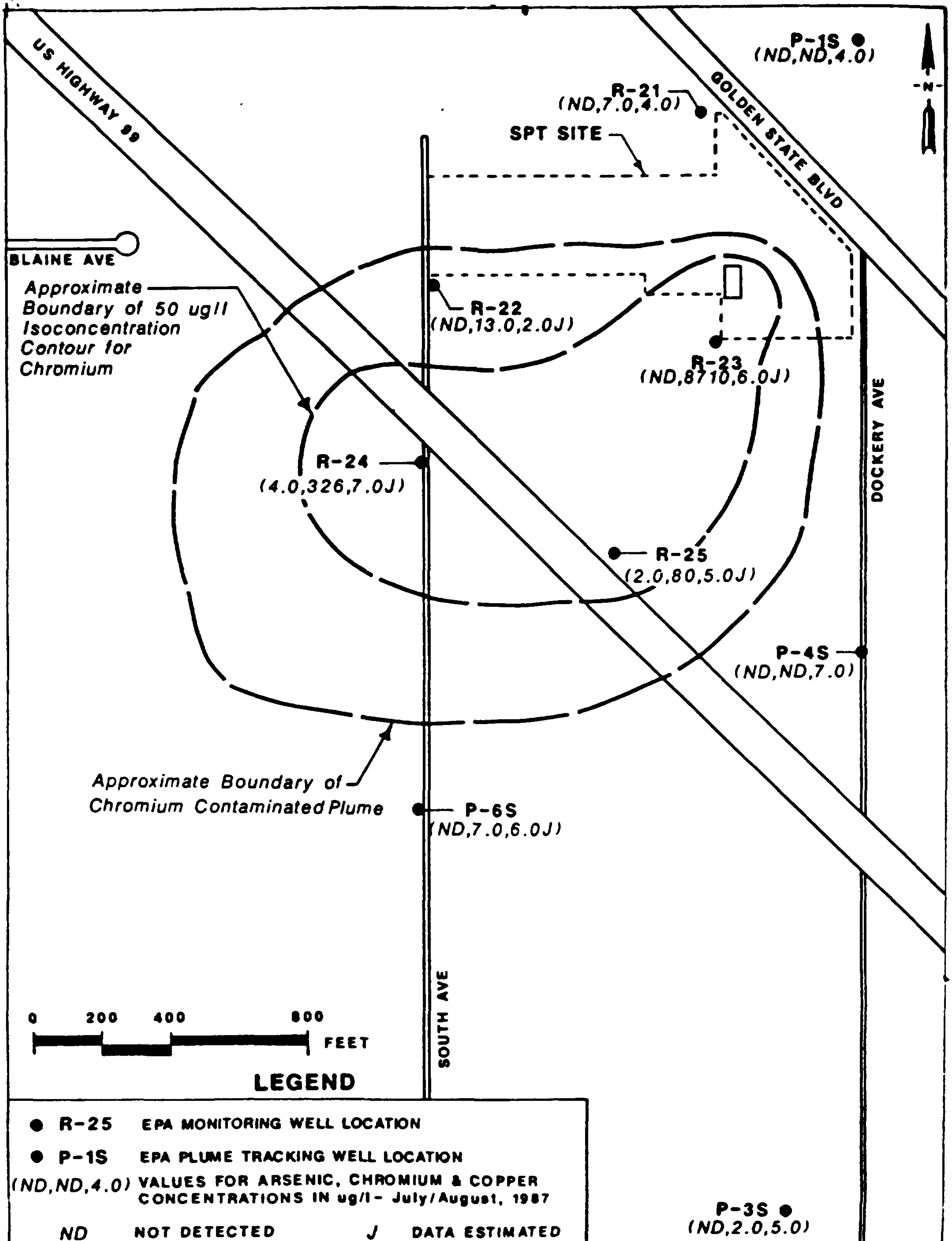
   Individual phenols (Method 604)
   RAS Metals
   General water quality parameters

3. Third Round, July-August 1987:

   Individual phenols (Method 604) - all wells
   Dissolved chromium, arsenic, copper - all wells
   Target Compound List (TCL) Volatiles - existing EPA and plume tracking monitoring wells
   TCL Semivolatiles - existing EPA and plume tracking wells
   Dioxin/furan homologs - five existing EPA monitoring wells

While there are several contaminants at elevated levels in the soil, chromium was the only contaminant of significance detected in the groundwater, due to the relative immobility of dioxin/furan, arsenic, and copper. Organics (dioxin/furan and PCP) are being resampled as part of remedial design related activities, but previously detected levels are believed to be due to sampling errors.

Sampling results indicate that a chromium contaminated plume extends downgradient from the site to the southwest (Figure 5). The southern boundary of this plume appears to range approximately 1,200 feet south-southwest of the existing wood treatment facility boundary. The groundwater contamination is apparently confined to



Project No.	Selma Treating Company Site	GROUNDWATER PLUME BOUNDARY MAP	Figure
123-RI1	Camp Dresser & McKee Inc.		5

the shallower portion of the aquifer (to 40'), and does not currently affect any municipal, private, irrigation, or industrial wells in the vicinity, based on the sampling results. Contamination was not detected in the deep monitoring wells at depths of 87-100'. However, contamination levels in the intermediate portions (40-60') of the aquifer have not yet been defined.

The extent of the chromium contaminated plume needs additional definition to the west and southwest of well R24. As part of remedial design, two well nests west and south of R-24 are planned. A well nest will consist of one shallow well (40') and one intermediate well (60').

Additional definition of the vertical extent of contamination within the groundwater plume is also planned as part of remedial design. Three intermediate level wells completed at depths of 60 feet will be paired with the existing shallow wells in this area.

Additional data will also be collected on the continuity of the clay layer present at a depth of 55 to 60 feet. This data will be collected during the monitoring well installation program described above.

Other monitoring well installation plans include a shallow monitoring well (40') downgradient of the Southeast Disposal Area, and an intermediate level monitoring well and two observation wells in the upgradient background area. Other groundwater characterization activities to be conducted as part of remedial design include:

1. Monthly water level measurements for one year
2. Quarterly water quality sampling for one year
3. Long-term aquifer testing
4. Efforts to locate and sample the original Brown and Caldwell monitoring wells

Based on evaluation of the data collected from the above described activities, a decision will be made regarding the need for any additional characterization.

D. Groundwater Cleanup Goals

The groundwater cleanup goal is the Maximum Contaminant Level (MCL) established under both the federal and state Safe Drinking Water Acts. Due to the fact that chromium was the only contaminant of significance detected in the groundwater, additive effects were not of concern. Therefore, it was possible to select an ARAR as a clean-up goal, rather than a risk assessment driven goal.

Currently the MCL pertinent to SPT is the 50 ppb level set for chromium. The federal MCL is proposed for revision to 100 ppb, however, the state 50 ppb standard will probably be in effect at the time of remedial action. The most stringent of the state or federal MCL in effect at the time of RD/RA will be used. For analyses in the Feasibility Study and Record of Decision, the 50 ppb MCL was assumed. The arsenic MCL of 50 ppb, is also an applicable ARAR for the SPT site. However, arsenic was detected only at levels well below the existing or proposed MCL.

The boundary of the groundwater plume exceeding the chromium clean-up goal is delineated in Figure 5. This boundary was based on the elevated chromium values observed in the shallow monitoring and plume tracking wells. The western extent of contamination was estimated, based on the observed trend of the plume in other areas. The extent of contamination in this area will be further defined during the RD phase, through the installation of additional monitoring wells, as discussed in the preceeding section.

The data collected from the deep plume tracking wells in the site vicinity indicate that the chromium contamination at a depth of 90-120 feet does not exceed the chromium clean-up goal of 50 ppb. The exact vertical extent of contamination that exceeds the clean-up goal in the intermediate portions of the aquifer will be further defined as part of the RD, as described in the preceeding section.

V. SUMMARY OF SITE RISKS

A. Chemicals Of Concern

Data collected during the RI were reviewed to select a subset of chemicals (chemicals of concern) for detailed evaluation in the risk assessment. Separate subsets were selected for surface soils, subsurface soils (soil borings), and groundwater, in order to reflect the different exposure pathways associated with these different media.

A comparison of on-site and background levels of metals in surface soils, reveals that only arsenic, chromium, and copper appeared at elevated levels above background. Therefore these site-related chemicals were selected as chemicals of concern in surface soil, from among the metals. The organics of concern in the surface soil, identified in the risk assessment, were phenols, dioxins, furans, bis(2-ethylhexyl) phthalate, and di-n-butylphthalate. An analysis of subsurface soils produces the same subset of chemicals of concern, except that the phthalates were not included. The levels of arsenic and dioxin/furan contamination in the soil were the only constituents exceeding the health based clean-up goals.

Groundwater samples were collected from domestic, industrial, municipal, and irrigation wells, and from fifteen monitoring wells. Site-related chemicals detected were arsenic, chromium, copper, pentachlorophenol, and two dioxin congeners. Based on considerations of toxicity, concentration, and relations to site activities, arsenic, chromium, copper, and the dioxins were selected as chemicals of concern. However, only chromium exceeded the clean-up goals in groundwater.

B. Exposure Pathways

Potential human exposure pathways at the SPT site include exposure to contaminated groundwater, exposure via direct contact with contaminated soil (including incidental ingestion), and inhalation of contaminated dust. Based on data from existing private and municipal wells, risks associated with current use of groundwater in the vicinity of the site were evaluated. Using estimates based on data from monitoring wells and groundwater modeling, potential future risks associated with use of local groundwater as a potable supply were also evaluated. For soil, the EA evaluated exposure of individuals working at the site or in the vicinity of the site, local residents, and trespassers. Direct contact (dermal absorption or inadvertent ingestion) and inhalation were the exposure routes used. A number of scenarios involving these types of exposure were examined. Finally, a number of scenarios examining the potential exposure of off-site receptors to contaminants present in windborne dust also were evaluated using an air dispersion model.

C. Toxicity Of Chemicals Of Concern

Both the carcinogenic and noncarcinogenic effects of chemicals of concern used in the EA analysis are presented below. Exposure to arsenic has been associated with an increased incidence of cancer in humans. Chromium has been associated with an increased incidence of lung cancer in humans exposed via inhalation, but has not been associated with an increased incidence of cancer when exposure occurs via ingestion. Bis(2-ethylehexyl)phthalate and 2,4,6 trichlorophenol are classified as probable human carcinogens based on evidence from animal carcinogenicity bioassays. Certain dioxins and furans are considered to be carcinogenic by EPA and are also toxic to the reproductive system and the immune system.

Exposure to chromium via ingestion is associated with non-carcinogenic toxicity, including decreased water consumption, and at higher levels, gastrointestinal disturbances, liver damage, kidney damage, internal hemorrage, dermatitis, and respiratory problems. Many of these effects are thought to be due to chromium VI, not to chromium III. Exposure to copper, chlorophenol, cresols, di-n-butylphthalate, 2,4-dichlorophenol, 2,4-dinitrophenol, 2- and 4-nitrophenol, pentachlorophenol, and phenol have been associated with a variety of systemic, noncarcinogenic effects in humans or experimental animals.

D. Risk Characterization

A quantitative assessment of potential risks posed by contaminants in the vicinity of the SPT site was performed. The potential for endangerment of human health under a number of current-use and future-use exposure scenarios was evaluated. For each exposure scenario evaluated, two exposure cases, an average and a plausible maximum case, were considered. For the average exposure case, mean concentrations are used together with what are considered to be the most likely (though conservative) exposure conditions. For the plausible maximum case, the highest measured concentrations are used, together with high estimates of the range of potential exposure parameters relating to frequency and duration of exposure and quantity of contaminated media contact.

To summarize the risk assessment, carcinogenic risks at SPT may be associated with exposure to surface soil contaminants and airborne particulates under current use scenarios. Under future use scenarios, exposure to groundwater contamination may pose both a carcinogenic and noncarcinogenic risk. Risk results for both the current-use and future-use scenarios are discussed below. The risk numbers are presented for carcinogenic risks greater than 1×10^{-6} or where the Chronic Daily Intake (CDI) exceeded the Reference Dose (RfD) for noncarcinogenic risks. Generally, at SPT these risks are associated with the plausible maximum scenario, rather than the average case.

1. Current-use scenarios: Under current-use scenarios, exposure of workers and residents to surface soil contaminants in the adjacent vineyard, through dermal adsorption and incidental ingestion, and inhalation were considered a carcinogenic risk. The plausible maximum risk associated primarily with exposure to arsenic and dioxin/furans was 3×10^{-4}, or the risk of three excess cancer cases during a lifetime exposure of 10,000 individuals.

   The plausible maximum cancer risk from exposure of trespassers to surface soil contaminants at the wood treating facility was 2×10^{-5}. For workers, the average risk was 6×10^{-6} and the plausible maximum risk was risk was 4 x 10^{-3}. Again this risk is associated primarily with exposure to arsenic and dioxin/furans.

The plausible maximum risks due to inhalation of contaminated dust are associated primarily with exposure to arsenic and chromium. The risk ranges from 1 x 10^{-5} to 5 x 10^{-6} for locations 250 meters north and south of the site and 500 meters southeast of the site.

Under current-use conditions, groundwater as a potable supply is not expected to be a potential health concern, since the CDI is less than the RfD. This is based on exposure to chromium, which is a noncarcinogen by ingestion. The reason the current-use scenario has no risk is that no drinking water wells are currently within the groundwater plume boundaries. Institutional controls are needed to ensure that no wells are drilled into the contaminated area for drinking water purposes, until remediation is completed.

2. Future-use Scenarios: Under future use conditions, use of the shallow groundwater as a potable supply may be a potential health concern under the plausible maximum scenario, where the CDI levels for chromium could be 49 times greater than the RfD.

For the deep groundwater, risk assessment based on a mass balance model indicated that the CDIs for several of the noncarcinogenic contaminants of concern could exceed their corresponding RfDs under both the average and plausible maximum scenarios. This is due to the potential for future leaching of contaminants, such as chromium, out of the soil into the groundwater.

Under the mass balance model, excess cancer risks associated with exposure to carcinogenic contaminants (primarily background arsenic) was estimated to be 3 x 10^{-2}. However, arsenic is not expected to be highly mobile at SPT, based on observed levels in groundwater. The mixing model used to derive the risk number did not account for attenuation of contaminants in the environment and represents a very conservative estimate of the potential future risk associated with groundwater use. Because of this, arsenic was not retained as a chemical of concern in the formulation of groundwater remediation alternatives in the FS.

Under future use scenarios, direct contact with soil contaminants or inhalation of contaminated particulates over relatively short periods of time by on-site construction workers, are not expected to be a potential health concern. This is the case for exposed individuals under either average or plausible maximum cases.

E. Analytical Methods Used

The Endangerment Assessment for the SPT site generally followed the guidelines established by EPA for risk assessments under CERCLA (EPA 1985a, 1986a) and for health risk assessments in general (EPA 1986b,c,d). The purpose of the assessment was to evaluate the No Action Alternative. The assessment was based on data generated under the EPA contract laboratory program (CLP).

VI. DOCUMENTATION OF SIGNIFICANT CHANGES, Section 117(b)&(c) of CERCLA

The preferred alternative in the Proposed Plan is the same as the remedy selected in this ROD: Soil fixation with a RCRA cap and conventional groundwater treatment. No significant changes are proposed at this time. Additional data collection activities that will occur as part of remedial design could impact information contained in the ROD.

VII. DESCRIPTION OF ALTERNATIVES

A. Alternative 1 - No Action

This alternative involves taking no action to treat, contain, or remove the contaminated groundwater and soil. Multi-media monitoring would be performed every five years to support a reassessment of the No Action Alternative. The costs for this alternative are as follows:

Capital cost	$18,000
Operation and maintenance (O&M) cost (annual)	$22,000
Present worth (life of project at 8% discount and 4% inflation rates)	$90,000

B. Alternative 2 - RCRA Cap with Slurry Wall

Alternative 2 is a containment alternative. The function of the multi-layer RCRA Cap is to prevent direct contact with soil by humans and wildlife, and to minimize the potential for airborne contamination. In addition, the low permeability Cap reduces infiltration and leaching of contaminants from the soil into the groundwater. The Cap would be constructed over the areas of contaminated soil that exceed the cleanup goals. Approximately 33,300 square feet of Cap would be required to cover these areas, based on the current clean-up goals.
The Cap would meet the RCRA closure requirements under

40 C.F.R. §264, Subparts F, G and N. An example of Cap construction according to EPA closure guidance would be:

1. A 2 foot clay layer with hydraulic conductivity no greater than 1 x 10^{-7} cm/sec.

2. A minimum 20 mil High Density Polyethylene (HDPE) geomembrane.

3. A one-foot sand layer with a hydraulic conductivity of 1 x 10^{-3} cm/sec and filter fabric.

4. A two foot top soil layer.

Capping does not eliminate the leaching of contaminants from the untreated waste left on-site. Fluctuating groundwater levels may cause groundwater contact with contaminated soils. This may result in additional contamination at levels above the MCL, particularly for chromium.

The groundwater component of this alternative is to install a slurry wall to isolate the contaminated groundwater from the uncontaminated portion of the aquifer. A 1,375 foot long wall would be keyed into a clay layer at a depth of 55 feet. Approximately 75 million gallons of contaminaated groundwater is estimated to need containment. Extraction wells would be placed inside the slurry wall to maintain the hydraulic gradient toward the contaminated groundwater being contained. Monitoring wells would be located downgradient and outside the slurry wall in order to evaluate the effectiveness of the wall over time. The risks of leaving contaminated groundwater in the aquifer would be potential exposure of users to water that does not meet the drinking water standards. Therefore, institutional controls to prevent such use are required.

The major limitation associated with the slurry wall is that the clay layer proposed for its base may not be thick or continuous enough to support the wall. Additional investigation of this clay layer would be needed to support this alternative.

The aquifer in the Selma area is currently classified under EPA's Groundwater Protection Strategy, as a Class II A aquifer, which is currently used for drinking water and other beneficial uses. Also, the Fresno area has a designated Sole Source Aquifer under the Safe Drinking Water Act, 42 U.S.C. §1424(e). Alternative 2 would not be consistent with protection of this groundwater resource, due to the continued exceedences of the MCL for chromium and the potential for continued leaching of chromium or other constituents from the soil.

Under Alternative 2, implementation requirements include obtaining permission for use of private property during Cap and slurry wall construction. The slurry wall would require permanent easements or private property acquisition along its alignment. Off-site treatment and disposal options for the extracted groundwater would need to be evaluated.

Long-term institutional controls would be implemented to prevent access by unathorized persons to the capped areas, including fencing, signs and other land use restrictions. Long-term access to capped areas, extraction wells, and monitoring wells would be needed by government officials or representatives to ensure O&M activities could occur. Finally, long-term institutional controls would be needed to prevent the use of the contaminated portions of the aquifer as a drinking water supply.

The implementation timeframe for Alternative 2 would be approximately two months for RCRA Cap construction and seven months for slurry wall construction, after property access agreements have been obtained.

Costs for Alternative 2 are as follows:

Capital:	$2,180,000
O&M:	$40,000
Present worth:	$2,390,000

C. Alternative 3 - Soil Fixation with a RCRA Cap and Conventional Groundwater Treatment

For soils, Alternative 3 has both treatment and containment components. The function of soil fixation, as treatment, is to create a monolithic soil matrix which inhibits leaching, using a stabilization and solidification process. The RCRA Cap, placed on top of the fixed soils would provide additional protection from surface disturbance and surface water infiltration. The waste to be treated is contained in the areas where the soil constituents exceed cleanup goals. Also, under this alternative, six dry wells will be evaluated and abandoned, as appropriate.

The arsenic and chromium contamination is considered a RCRA characteristic waste under 40 C.F.R. §261.24. The dioxin and PCP waste is considered a RCRA K001 listed waste under 40 C.F.R. §261.32. Once excavated, substantive RCRA standards for treatment, storage and disposal of these wastes under 40 C.F.R. §264 apply. In addition, disposal of K001 waste is regulated under 40 C.F.R. §268, Land Disposal Restrictions, since placement has occurred. The volume of contaminated soils requiring treatment total approximately 16,100 cubic yards of material. Volume estimates will be further refined during remedial design, and should be considered estimates here.

The typical on-site fixation operation includes a batch plant for mixing the fixative agent (cement, silicate materials, and additives), and conventional construction equipment for excavating and backfilling the soil. The batch plant and staging area for temporary storage of contaminated soils is proposed for a 1.5 acre area in the northwest corner of the SPT site. The staging area will comply with RCRA regulations under 40 C.F.R. §264, Subpart L - Waste Piles, calling for temporary double synthetic liners and a double leachate collection system. The temporary waste and storage facilities will also need to comply with the construction standards for Class I waste piles in Title 23, Subchapter 15, California Code of Regulations (CCR). Cap construction will be as outlined for Alternative 2, and will meet the same RCRA applicable or relevant and appropriate requirements (ARARS).

The fixed soil will meet the leachablity requirements for the appropriate site-specific constituents under RCRA. The maximum concentration of arsenic and chromium characteristic wastes, using EP toxicity, is 5 mg/l under 40 C.F.R. §261.24. It is predicted that fixation will meet land disposal restriction level under 40 C.F.R. §268, of 37 ppm for PCP, using a total waste analysis test.

Also, as discussed previously, soils will be tested during remedial design to determine the soluble fraction of the contaminants and the attenuation factor. Based on this testing, treatment goals needed to protect groundwater will be evaluated by EPA and the RWQCB. The RWQCB recommends site-specific cleanup goals under the authority of the Porter Cologne Water Quality Control Act California Water Code §§13000 et seq.

Under Alternative 3, residual levels of arsenic, dioxin/furan, chromium, copper, and phenols below the health risk-based cleanup goals would remain onsite, untreated. Based on the Endangerment Assessment for SPT it was determined that these residuals will not pose an unacceptable risk to public health or the environment. The solubility testing will ensure that residual levels do not pose a risk to groundwater.

There is a potential for the future breakdown of the monolithic soil matrix. To reduce this potential the fixed soils will be covered with a Cap that meets the RCRA requirements as described under Alternative 2. Long-term monitoring will also be performed to meet the substantive RCRA requirements for closure under 40 C.F.R. §264, Subpart F, G and N.

For the groundwater component of Alternative 3, a conventional precipitation, coagulation, and flocculation process is proposed to remove chromium to the MCL level. Based on the assumption of a 50 ug/l MCL and a two dimensional model, the volume of extracted groundwater requiring treatment is estimated at 2.7 billion gallons. This estimate will be further defined during the remedial design phase of the project, based on additional aquifer testing and monitoring well installation.

Based on the estimate discussed above and the distribution of the plume, approximately 25, 6-inch diameter extraction wells, 50 feet deep will be pumped at a cumulative total of 1,040 gallons per minute for five years. This assumes a treatment plant operating 24 hours a day, seven days a week, with an online availablity of approximately 95%. The five year timeframe is based on several assumptions regarding estimates of extent of contamination, the number of extraction and injection wells, and the volume of groundwater requiring treatment. Specific timeframes will be further defined as part of RD. A range of 5-10 years may be more realistic, depending on the results of data collected during RD.

The treatment facility will consist of an influent storage tank, a rapid mix unit, a slow mix unit, a sedimentation tank, a filter, a treated effluent storage area, and associated piping, valves, and pumps. This facility proposed for location in the vineyard south of the wood treating facility, will occupy approximately 1/2 acre.

Based on satisfactory treatment and testing of the groundwater, either reinjection or off-site disposal will occur. If reinjection is appropriate, approximately 35, 4-inch diameter recharge wells will also be distributed throughout the aquifer.

The treatment level to be achieved is the more stringent of the federal or state Safe Drinking Water Act Maximum Contaminant Levels. Currently this level is 50 ppb, under both federal and state law. Residual untreated groundwater would not exceed the MCL. Residual treated groundwater would either be reinjected or disposed of off-site. For reinjection, substantive requirements of the Safe Drinking Water Act 42 U.S.C. §§1421-1422, 40 C.F.R. §§144-147, would be met. For off-site disposal, the RWQCB would establish discharge limits consistent with requirements under the National Pollutant Discharge Elimination System (NPDES) program. The reinjection of treated groundwater will also be regulated by substantive RWQCB waste discharge requirements to provide protection of the beneficial uses of the underlying groundwater.

The sludge generated from the treatment facility will be dried in lagoons on two acres adjacent to the treatment facility. The sludge will be disposed of at an approved off-site RCRA facility or municipal landfill, depending on sampling results. The sludge lagoons will be constructed to RCRA standards as set forth in 40 C.F.R. §264 - Subpart K - Surface Impoundments, which require two or more liners and a leachate collection system. Synthetic liners are proposed for use at SPT. The sludge lagoons will also need to meet the construction criteria in Title 23, Subchapter 15 of the CCR, regulated by the RWQCB. Other options, for sludge drying, such as mechanical methods, will be considered during the design phase.

Regarding implementation requirements for soil remediation activities under Alternative 3, equipment and materials for Cap construction are readily available. Treatability testing is required for soil fixation, and is currently being performed. There are numerous commercial enterprises involved in developing and marketing fixation technology. Sixteen companies were identified in a vendor survey as capable of providing expertise in treating metals and organics with solidification and stabilization processes. Access to private property will be needed for the batch plant and staging areas.

Short-term worker protection during soil excavation will be required, consistent with federal and California Occupational Safety and Health Act (OSHA and Cal OSHA) standards. EPA currently has federal-lead jurisdiction for worker protection at wood treating facilities. However, EPA has adopted OSHA standards for use at these sites. Excavation, storage, and fixation of soil are also subject to Fresno Air Pollution Control District (APCD) Rules 210.1, 404, 405, and 418. Discharges during remediation could include: (1) fugitive dust containing toxic metals and toxic organics, and (2) volatile toxic organics. Requirements of the Clean Air Act, 42 U.S.C. §7401 <u>et seq</u>, are incorporated into APCD Rules, per Section 110 of the Clean Air Act.

For the groundwater component, implementation requirements include disposal of treatment residuals, utility requirements, access to private property for the treatment plant and sludge lagoons, treatability studies for waste stream characteristics, and disposal of treated water. Significant implementation obstacles are not foreseen.

The main uncertainty regarding Alternative 3 is the implementability of soil fixation based on treatability testing. If this test is not successful, it will be necessary to select a different alternative to remediate SPT site soils.

The groundwater classification is Class II A, and implementation of Alternative 3 would be consistent with maintaining the use of the aquifer for drinking water and other purposes.

Short-term institutional controls include limiting access to the staging area, treatment areas, and sludge drying beds, through use of fencing, signs and security. Until remediation of groundwater is achieved, institutional controls over the use of the contaminated portions of the aquifer will be required. Long-term institutional controls include access restrictions to capped and fixed areas, and long-term access for monitoring and maintenance activities.

The implementation timeframe for Alternative 3 is approximately 12-18 months for the soil component and 5-10 years for groundwater treatment.

Costs associated with Alternative 3 are estimated as follows:

Capital:	$ 6,500,000
O&M:	$ 1,300,000
Present Worth:	$11,280,000

D. <u>Alternative 4 - On-site Rotary Kiln with Off-site Disposal and Conventional Groundwater Treatment</u>

This alternative has both treatment and containment (disposal) components. The groundwater components are the same as described in Alternative 3 and will not be discussed further here. The soil treatment component applies to the organic constituents in the soil. An on-site rotary kiln would be used to incinerate dioxin/furan and pentachlorophenol wastes totalling 7800 cubic yards. Included with the organic wastes are metal constituents that would not be destroyed during incineration. In addition, there is another 8300 cubic yards of metals contaminated soil with no organic contamination. All of the soils, treated and untreated (a total of 16,100 cubic yards), would be disposed of at an off-site RCRA facility. The SPT wastes containing pentachlorophenol would require treatment (e.g., incineration) prior to disposal to meet the present RCRA Best Demonstrated Available Technology (BDAT) requirements of 37 ppm, under 40 C.F.R. §268. The untreated arsenic and chromium contaminated wastes are RCRA characteristic wastes and therefore require disposal at an approved RCRA Class I facility.

The mobile unit assumed for SPT is rated at 15 million BTU/hour and treats 4.50 tons/hour of dry solids. The primary (i.e., rotary kiln) and secondary (i.e., afterburner) combustion chambers are generally mounted on concrete slabs. Approximately .5 acres is expected to be required for stockpiling excavated soil, locating feed handling and preparation equipment, and temporary storage of decontaminated soil. Sufficient area for processing exists on the storage yard being used by the present wood treating operation.

For organics, treatment levels achieved would be the BDAT treatment level requirements for PCP of 37 ppm and the 1 ppb clean-up goal for dioxin/furan contamination. For the incinerator, 99.99% destruction and removal efficiency (DRE) is required under 40 C.F.R. §264, Subpart O, for the principal organic hazardous constituents (POHCs). The metals would remain untreated, and would either be captured in the air pollution control equipment or remain in the incinerated soil residuals.

If BDAT for metals under 40 C.F.R. §268 is in effect at the time of project implementation, then these levels would need to be met as well. For this ROD it is assumed that the incinerator soil residuals would require disposal at a RCRA Class I facility due to the metals content of the residue.

Under the California Air Resources Act, California Health and Safety Code §39650 et seq, the Air Pollution Control District (APCD) will set emission limits for discharges associated with use of the incinerator under APCD Rule 210.1, New Source Review. Rules 404, 405, 418 and 417 also apply to excavation and incinerator activities. Discharges associated with soil excavation may consist of: (1) fugitive dust containing toxic metals and/or toxic organics, and (2) volatile toxic organics. Compliance with APCD Rules includes Clean Air Act requirements.

Implementation requirements include access to a mobile rotary kiln, of which there may be a limited supply. Acceptance of SPT wastes at an off-site RCRA facility would be determined based on waste characteristics and BDAT requirements in effect at the time of waste disposal. Access to private property is required for the incinerator, groundwater treatment systems, and monitoring well installation activities. Pilot work would be necessary to aid in addressing materials handling requirements and to assess air emissions.

Alternative 4 would be consistent with the area's Class II A aquifer classification. The contaminated groundwater would be treated and contaminated soils would be removed. The removal of the contaminated soil would prevent the possibility of continuing migration of the contaminants to the groundwater. As stated previously, soil clean-up goals will be evaluated after solubility testing to ensure protection of groundwater quality.

Institutional controls include short-term access restrictions to the soil and groundwater treatment areas, and restrictions over the use of the contaminated portions of the aquifer for drinking water purposes. Long-term institutional controls are not needed for this alternative.

The soils remediation implementation timeframe for Alternative 4 would be 7-10 months at an incinerator unit operating 24 hours a day, seven days a week, with online availability of 80%. An additional 1-2 months would be required to demobilize equipment. Groundwater treatment is estimated to take 5-10 years.

Costs estimated for Alternative 4 include:

Capital:	$15,630,000
O&M:	$1,290,000
Present worth:	$20,360,000

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

A. Overall Protection of Human Health and the Environment

1. No Action: No protection is provided, although monitoring would provide a warning indicator of contaminant transport.

2. RCRA Cap with Slurry Wall: Partial protection is provided, with ongoing maintenance. The migration of contaminated groundwater is restricted from reaching uncontaminated portions of the aquifer. Direct contact with soils and generation of contaminated airborne dust is prevented. The Cap also limits infiltration of surface water and contaminant mobility. Institutional controls are necessary to prevent the use of contaminated groundwater exceeding primary drinking water standards. Continued leaching of capped soils due to groundwater fluctuations could exacerbate the chromium contamination problem.

3. Soil Fixation with RCRA Cap and Conventional Groundwater Treatment: For soil, protection is provided with ongoing maintenance. Cap protection features are the same as for Alternative 2. Addition of the fixative agent greatly reduces continued leaching of contaminants to groundwater, protecting potable water supplies from a continuing source of contamination. Groundwater treatment provides complete protection to the MCL cleanup level.

4. On-site Rotary Kiln and Off-site Disposal with Conventional Groundwater Treatment: For soil, complete protection is provided on-site. No contaminants exceeding the cleanup goals remain at SPT. Careful short-term incinerator operation would be

required to assure that significant adverse air quality impacts do not occur. For groundwater, the same complete level of protection is provided as for Alternative 3.

B. Compliance with ARARS

1. Alternative 1: Does not comply with MCLs for groundwater. No action would be taken to meet ARARS.

2. Alternative 2: Does not comply with MCL for chromium or Porter Cologne Water Quality Act cleanup goals for soils (a requirement "to be considered," rather than an ARAR). Would comply with RCRA requirements under 40 C.F.R. §264, Subparts F, G, and N.

3. Alternative 3: Will comply with all ARARS, including MCLs, RCRA BDAT for K001 listed waste, and RCRA closure requirements.

4. Alternative 4: Would comply with all ARARS identified at this stage, including MCLs, RCRA BDAT for K001 listed waste, and RCRA requirements for off-site disposal of waste.

C. Long-term Effectiveness and Permanence

1. Alternative 1: Not a permanent solution.

2. Alternative 2: Not a permanent solution. Long-term monitoring and maintenance activities are associated with the Cap. Groundwater is not treated. Long-term institutional controls would be required to ensure that drinking water wells are not located in the contaminated portions of the aquifer.

3. Alternative 3: For soil, full permanence cannot be assured due to limited experience with the fixation technology. Long-term maintenance and monitoring is required. Depending on the monitoring results, additional work could be required in the future if the monolithic soil matrix breaks down. For groundwater, a permanent solution.

4. Alternative 4: For soil, a permanent solution for organics (dioxin/furans and PCP); but not permanent for metals. Off-site disposal requires long-term O&M at the RCRA facility. For groundwater, a permanent solution.

D. Reduction in Toxicity, Mobility and Volume (TMV)

1. Alternative 1: Does not reduce TMV.

2. Alternative 2: Reduces mobility but not toxicity or volume.

3. Alternative 3: For soil, mobility significantly reduced, toxicity is not reduced, and volume is increased due to the addition of the fixative agent. For groundwater, TMV reduced.

4. Alternative 4: For soil, near complete reduction of toxicity and mobility for organics. For metals, reduces mobility only by removing contaminants from the site and containing them in a Class I RCRA facility. For groundwater, TMV reduced.

E. Short-term Effectiveness

1. Alternative 1: There would be no short-term impacts.

2. Alternative 2: Short-term impacts to workers associated with slurry wall and Cap construction would be minimal.

3. Alternative 3: Short-term exposure to workers during soil excavation and treatment, and groundwater well installation could occur. Worker safety precautions and dust suppression needed to protect workers and others onsite and in site vicinity.

4. Alternative 4: Short-term impacts would be comparable to Alternative 3. Differences include short-term potential for accidental spillage during off-site transport of wastes and exposure to incinerator emissions. Air pollution control equipment and careful transport required in addition to measures outlined in item 3, above.

F. Implementability

1. Alternative 1: No implementability factors are relevant.

2. Alternative 2: The technology for both the RCRA Cap and slurry wall are readily available. The technical feasibility of the slurry wall is questionable due to potential problems with inadequate thickness and continuity of the clay layer. Access problems associated with the slurry wall alignment may also arise.

3. Alternative 3: The RCRA Cap and conventional groundwater treatment technologies are readily available and proven. Property access/acquisition problems may arise for the well installation and treatment areas. Fixation technology requires site-specific treatability testing to verify effectiveness prior to use.

4. Alternative 4: Conventional groundwater treatment issues are the same as under Alternative 3, above. Use of incinerator requires prior on-site treatability testing in coordination with the local APCD. Off-site disposal of wastes requires acceptance by the receiving facility depending on actual waste characteristics analysis. Regulatory status governing off-site disposal of land ban wastes may influence disposal options at time of remedial action.

G. Estimated Capital, O&M, and Present Worth Cost

	CAPITAL	O&M	PRESENT WORTH
Alt 1 No Action	$18,000	22,000	90,000
Alt 2 Slurry Wall/ RCRA Cap	2,180,000	40,000	2,390,000
Alt 3 GW Treatment/ Fixation	6,500,000	1,300,000	11,280,000
Alt 4 GW Treatment/ Rotary-Kiln/ Off-Site Disposal	15,630,000	1,290,000	20,360,000

H. State and Community Acceptance

1. Alternative 1: Not acceptable to the state; no input was received from the community.

2. Alternative 2: Not acceptable to the state due to potential insufficiency of clay layer to key slurry wall into and because chromium remaining in soils under the Cap could leach to groundwater. No community input received.

3. Alternative 3: Acceptable to the state. Additional remedial design-related groundwater and soil sampling and treatability testing will be reviewed by the state for continued acceptance of remedy. No community comments received.

4. Alternative 4: State concerned about potential incinerator emissions-related public perception and regulatory approval problems. Incinerator pilot testing and remedial design-related sampling results would be reviewed by the state. No community issues raised at this time.

IX. THE SELECTED REMEDY

Alternative 3 - Conventional Water Treatment and Soil Fixation with a RCRA Cap, has been selected as the remedy for the SPT site. Remediation of the chromium contaminated groundwater under this alternative consists of pumping the groundwater from the aquifer, treating it in an on-site facility utilizing a conventional water treatment method, and disposing of the treated effluent through reinjection into the aquifer, or off-site, as appropriate.

The soil remediation component of this alternative consists of excavating the contaminated soil, transporting it to a processing plant onsite; "fixing" the soil with cement, silicate and other bonding agents; and then backfilling and compacting the fixed material on-site. Fixed areas of soil will then be covered with a RCRA Cap.

X. THE STATUTORY DETERMINATIONS

A. Protection of Human Health and the Environment

The selected remedy will eliminate risk of exposure to groundwater contaminated with chromium above MCL levels. The remedy will eliminate exposure to contaminated soil that exceeds groundwater and health based cleanup goals. In the case of soils, the contaminants will not be removed or destroyed. Long term O&M is required to ensure that the soil remedy is effective.

Adequate safety precautions will be used during construction and treatment activities. Therefore, unacceptable short-term impacts are not expected. Cross media impacts are also not foreseen associated with this remedy. Careful attention to drilling techniques will be paid to ensure that drilling will not contaminate the deeper, unaffected portions of the aquifer. Cleanup goals will take into account the potential leaching of soil contaminants into the groundwater. Careful dust suppression methods during all remedial activities will ensure that contaminants are not transmitted into the air at unacceptable levels during construction. The RCRA Cap will provide long-term protection agaist transmission of contaminated particulates into the air.

B. Attainment of ARARS

The selected remedy will attain the applicable or relevant and appropriate requirements determined to date; no ARARS waiver is necessary. The following are the main ARARS that have been determined to apply to the remedy:

Statute	Standard
Safe Drinking Water Act 42 U.S.C. §300A *et seq*; 40 C.F.R Part 141.	Maximum contaminant levels for chromium and arsenic in groundwater.
Safe Drinking Water Act 42 U.S.C. §300A *et seq*; 40 C.F.R. Parts 144-147.	Underground injection control requirements for Class V Wells, including dry wells.

Safe Drinking Water Act 42 U.S.C. §1424(e).	Prohibits any project with federal financial assistance from contaminating a Sole Source Aquifer.
Resource Conservation and Recovery Act 42 U.S.C. §6901 _et seq_; 40 C.F.R. Parts 257, 261, 262, 263, 264, 265, 268.	Practices to be followed by generators, transporters, owners and operators of hazardous waste. Standards for land disposal of certain restricted hazardous wastes.
California Safe Drinking Water and Toxic Enforcement Act. California Health and Safety Code §252.5 _et seq_.	The state MCL for chromium.
California Air Resources Act. California Health and Safety Code §39650 _et seq_.	Discharge limits for activities conducted during the remedial action. Includes Clean Air Act requirements.
Porter Cologne Water Quality Control Act. California Water Code §13000 _et seq_.	Waste discharge requirements, NPDES discharges, specific cleanup standards established on a site specific basis.
California "Superfund" Law - Hazardous Substances Account Act/ Hazardous Substances Cleanup Bond Act. California Health and Safety Code §25300 _et seq_.	Substantive requirements of a Remedial Action Plan (RAP).
California Occupational Safety and Health Act. California Laboratory Code §6300 _et seq._	Standards for worker protection during remediation.
Occupational Safety and Health Act. 29 U.S.C. §651 _et seq_.	Under 40 C.F.R. §300.38, OHSA requirements apply to all activities conducted under the NCP.

C. <u>Cost-Effectiveness</u>

The selected remedy estimated at $11,280,000 is the least expensive of the remedies that meet the statutory criteria of protection of public health and the environment, and attainment of ARARS. For example, alternative 4, Conventional Water Treatment/Incineration and Off-site Disposal is estimated at $20,360,000; almost double the selected remedy. Alternative 2, slurry wall/RCRA Cap, is much less costly than the selected remedy at an estimated $2,390,000; but would not be protective of public health or meet ARARs.

D. Utilization of Permanent Solutions Employing Alternative Technologies to the Maximum Extent Practicable (MEP)

The selected remedy is an appropriate solution for the site. It will effectively treat groundwater contaminants, prevent contact with soil contaminants, and prevent leaching of contaminants to the groundwater at levels above the MCL. The remedy provides protection of public health, achieves ARARS compliance and is cost-effective.

In comparison, on-site and off-site RCRA disposal options are more problematic for soils at SPT than the chosen method of fixation. An on-site RCRA landfill would not meet RCRA or CCR siting criteria due to the site geology and presence of a Sole Source Aquifer. Since BDAT was not established for the dioxin K001 waste, it could conceivably be disposed of off-site, along with the metal contamination, without treatment. The PCP wastes would require treatment to the 37 ppm BDAT standard. However, straight off-site disposal of wastes does not comply with the intent of CERCLA for remedies that use permanent solutions and treatment to the maximum extent practicable. Finally, the regulatory status governing land disposal of SPT waste is in a state of development. It is not certain whether RCRA disposal facilities would accept SPT wastes at the time of remediation; and if so, what Best Demonstrated Available Technology (BDAT) would be required (BDAT may be promulgated for arsenic).

In regard to soil treatment methods, fixation and incineration were the only two that were deemed technically feasible in the FS screening process. Incineration, however, treats only the organic contents of the SPT waste, resulting in untreated metals requiring disposal. Fixation has been identified as a feasible technology for the low organic/high metals ratio in the SPT wastes. (Treatability testing will be performed to ensure that this method will effectively treat SPT wastes). The sandy-silty soil composition at SPT is also amenable to fixation.

Several nonthermal treatment process for removing soil contaminants at SPT were examined, including physical, chemical, and biological. Of the physical methods, (fixation and soil washing), soil washing was found not to be effective for removing the relatively low arsenic and chromium concentrations in the waste, and is not an effective remedy for organic wastes. For chemical methods, nucleophilic substitution, or KPEG, only applies to the organics and has not been demonstrated effective in removing the dioxin/furan concentrations to the 1 ppb level.

Biological treatment processes, both on-site and in-situ, were examined for soil treatment. Biological treatment applies only to the organic contaminants in the waste, and does not treat the metals. However, laboratory tests did not show reduction of dioxins to the 1 ppb level and no large scale pilot studies have been conducted on use of biodegradation for dioxin wastes.

For groundwater treatment, the metals-precipitation chromium removal technology selected for groundwater cleanup is a conventional and effective method commonly used in industrial processes. The other groundwater treatment method evaluated in detail was ion exchange. However, ion exchange processes would not be effective in treating site groundwater due to the potential for clogging of the resins. Clogging occurs as the trivalent chromium in the water will readily precipitate out of solution as chromium hydroxide. In addition, large quantities of brine are generated, increasing costs over conventional treatment without greater protection.

Therefore, in comparison to other possible technologies, soil fixation with a RCRA Cap and conventional groundwater treatment have been determined to be the most appropriate technologies for the SPT site.

For groundwater, the remedy selected is considered the maximum extent to which a permanent solution and treatment can be practicably utilized. For soil, full permanence cannot be assured due to limited experience with the fixation technology. Therefore, long-term monitoring is required. In terms of treatment, the contaminants are rendered immobile by application of the fixative agent. However, this form of treatment does not reduce contaminant volume or significantly reduce toxicity.

A fully permanent treatment solution for the combination of wastes present in the SPT soil was not determined to be feasible at this time. Therefore, the selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized.